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PATENT SPECIFICATION

348,327

Application Date: April 7, 1930. No. 10,982/30.

Complete Left: Jan. 2, 1931.

Complete Accepted: May 14, 1931.

PROVISIONAL SPECIFICATION.

Rubber Bearing Bushes.

I, HAMILTON NEIL WYLIE, a British Subject, of "Morecroft", Manor Road, Twickenham, Middlesex, do hereby declare the nature of this invention to be as follows:—

This invention relates to rubber bushes, of the kind which is adapted normally for use where only small angular movements are to be dealt with, during which the rubber merely deforms.

The chief object of the invention is to provide a simple construction, which can easily be fitted and which will carry considerable load, but cannot be overstressed by excessive angular movements.

According to this invention, the rubber sleeve is united, as by cementing or vulcanization, with a liner which is to all intents and purposes inextensible when the bush is fitted in position. Thus the rubber is prevented from spreading.

Preferably the bush is vulcanized to a liner consisting of a material having a high coefficient of friction, and therefore will not easily slip. Suitable materials are vulcanite, canvas, or other impregnated woven cotton.

In one application of the invention, the bush embodies a tube of non-metallic distortable material which has a high coefficient of friction, such as woven fabric or cotton impregnated to have the necessary stiffness and frictional qualities. This constitutes the liner and is adapted to engage the inner member of the bearing under relatively considerable radial pressure, as described later.

To this liner is cemented or vulcanized a rubber sleeve, and the sleeve and liner so united constitute the complete bush

In employing a bush so constructed, it is inserted (being a push fit) in the eye or bearing, which is slightly longer than the bush so that there is no possibility of the bush projecting beyond the eye at the other end. The inner bearing member is then inserted, this part being slightly larger in diameter than the bore of the liner. The liner is thus stretched radially and therefore the complete bush is subjected to slight radial compression at all times. Further, the liner is caused firmly to grip the inner bearing member and this, aided by the fact that it is made of material having a high coefficient of friction, prevents any slipping between the liner and the inner bearing member during small angular movements when the rubber portion merely deforms in the well-known manner. In the event of a large angular movement occurring, before the rubber sleeve becomes so highly stressed as to be in danger of disintegration or damage, the liner will slip on the inner bearing member.

In some cases, for example in applying a rubber bush to a spring mounting in which the hanger comprises a pair of fixed jaws, the liner would be mounted upon a tubular metal distance-piece extending from jaw to jaw, this constituting the shaft portion inside the bush. To hold this distance-piece in position, the hole in one jaw of the hanger may be of a diameter equal to that of the distance-piece, and the hole in the other jaw may be made smaller. A bolt is passed through from jaw to jaw, its diameter being equal to that of the smaller hole. Near the head of the bolt is a washer, or an integral part of the bolt, of a diameter to fit the larger hole, and the parts are so dimensioned that, as the nut on the bolt is tightened up, this enlargement bears upon the end of the distance-piece and clamps it against the jaw portion with the smaller hole.

The liner to which the rubber sleeve is united may be arranged either inside the rubber sleeve, or outside it, or there may be a liner both inside and outside.

In most cases the liner would be a complete plain tube but it may be slit lengthwise to allow the insertion of an oversize inner member and impart the necessary radial compression to the rubber.

The surface of the bush which is not united to the liner may be cemented into the outer bearing member to increase the adhesion and prevent relative slip.

Where there is a possibility of the bush being subjected to tilting, as is the case with certain kinds of spring shackles, annular shims of thin hard metal, preferably stainless steel, may be arranged between the ends of the spring eyes (or

the equivalent) and the shackles. At least two of such shims must be employed at each point, and the outer surfaces, or the outer shims, tend to adhere to the faces of the softer spring shackles and spring eyes. Consequently, the shims rub on each other and afford lateral support which prevents tilting and overloading of the end parts of the rubber bushes.

Where a tubular distance-piece is used in conjunction with separate side links or shackle links, it may be clamped between the latter in the known manner.

Dated this 5th day of April, 1930.

ERIC W. WALFORD, M.I.A.E.
Fellow of the Chartered Institute of Patent Agents,
19, Hertford Street, Coventry,
Agent for the Applicant.

COMPLETE SPECIFICATION.

Rubber Bearing Bushes.

I, HAMILTON NEIL WYLIE, a British Subject, of "Morecroft" Manor Road, Twickenham, Middlesex, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to composite bushes, for concentric inner and outer bearing members, of the kind wherein a rubber sleeve is united with an internal or external liner of harder material, the bush being mounted in such a way that small relative angular movements of the members merely cause the rubber to deform, whereas in the event of excessive movement the hard liner slips on the coacting member and prevents overstressing of the rubber.

An example of such a bush is shown in the Specification of my prior Patent No. 286,330. According to a preferred adaptation described in the specification, the liner is of brass or other material that is ductile under high stress, and the bush is placed in position and compressed or expanded so that the liner receives a permanent set which causes the rubber sleeve to be permanently compressed.

The chief object of the present invention is to facilitate the fitting of the bush.

According to the invention, the external diameter of the bush is substantially equal to the bore of the outer bearing member and the bore of the bush is so much less than the external diameter of the inner bearing member that, as the parts are being assembled with the bush between the members, the bush will be engaged thereby under relatively considerable radial pressure.

Preferably the inner bearing member consists of a bolt with a metal sleeve in one or more pieces surrounding and secured to it.

In the accompanying drawings,

Figure 1 is an axial section of a composite bush applied to a hanger of a vehicle suspension spring according to the invention;

Figures 2 and 3 are similar views showing modifications, while

Figure 4 shows one form of oversize sleeve in process of insertion into the bush.

Like numerals indicate like parts throughout the drawings.

In all the constructions illustrated, the bush embodies a tube 2 of a non-metallic distortable material which has a high coefficient of friction, such as woven fabric or cotton impregnated to have the necessary stiffness and frictional qualities. This constitutes the hard liner and is adapted to engage the inner member of the bearing under relatively considerable radial pressure, as described later.

To this liner is cemented or vulcanized the rubber sleeve 3, and the sleeve and liner so united constitute the composite bush.

In the application of a bush so constructed to the hanger bearings of a vehicle suspension spring, the bush is inserted (being a push fit) in the spring eye 4 or other housing, which is preferably slightly longer than the bush so that there is no possibility of the rubber portion thereof projecting beyond the ends of the eye. The inner bearing member or pivot pin is then inserted, this part, in accordance with the invention, being slightly larger in diameter than the bore of the liner 2. The liner is thus stretched radially and therefore the complete bush is subjected to material radial compression at all times. Furthermore, the liner is caused firmly to grip the inner bearing member and this, aided by the fact that it is made of material having a high coefficient of friction, prevents any slipping between the liner and the inner bearing member during small angular movements when the rubber portion merely deforms in the well-known manner. In the event of a large angular movement occurring before the rubber

sleeve becomes so highly stressed as to be in danger of disintegration or damage, the liner will slip on the inner bearing member. The liner 2 is to all intents and purposes inextensible when the bush is fitted in position, and the rubber sleeve 3 is thus restrained from spreading longitudinally under pressure.

Where, as in the constructions illustrated, the bush is applied to a spring hanger (shackle or dumb iron) having a pair of fixed jaws 5, 5, the inner bearing member conveniently takes the form of a tubular metal distance-piece 6 extending from jaw to jaw. To hold this distance-piece in position, when the jaws are connected by a rigid web 7, the hole 8 in one jaw of the hanger may be of a diameter equal to that of the distance-piece 6, and the hole 9 in the other jaw may be made smaller. A bolt 10 is passed through from jaw to jaw, its diameter being equal to that of the smaller hole 9. Near the head 11 of this bolt is a washer, or an integral part 12 of the bolt, of a diameter to fit the larger hole 8, and the parts are so dimensioned that, as the nut 13 on the bolt is tightened up, this enlargement 12 bears upon the end of the distance-piece 6 and clamps it against the jaw 5 having the smaller hole 9. (See Figure 1).

Where such a tubular distance-piece is used in conjunction with separate side links, or shackles which are sufficiently resilient, it may be clamped between the latter in the known manner, as shown in Figures 2 and 3 both holes 14 being of equal size Conveniently, the shackles are formed by pressing from mild sheet steel, so that the webs connecting the jaws are able to yield slightly as the bolt 10 is tightened.

In Figure 1, a plain metal distance-piece 6 is used, this being inserted into the bush from one side only, so that the deformable rubber 3 is expanded into the spring eye 4, where it may be further secured by cementing at 15 to prevent relative slip.

In this case it will be seen that the rubber sleeve 3 comes flush with, or may even project slightly from each side of the eye, sufficient clearance being provided between it and the jaws 5 to obviate any risk of squeaking due to contact between the jaw and the rubber. The liner 2 is usually considerably longer than the sleeve 3 and is arranged to bear against the jaws 5.

Where there is a possibility of the bush being subjected to tilting and heavy side forces, as is the case with certain kinds of spring shackles, annular shims 16 of thin hard metal, preferably stainless steel, may be arranged between the ends of the spring eyes 4 (or the equivalent) and the shackle jaws 5. Provided that at least two of such shims are employed at each point, their outer surfaces (or the outer shims) tend to adhere to the faces of the softer spring shackles and eyes, and consequently the shims rub on each other and afford lateral support which prevents tilting and overloading of the end parts of the rubber bushes. In this case, the deformable rubber sleeve, before compression, should be considerably narrower than the spring eye, to allow for slight spreading under load.

The feature of Figure 3 is that the metal distance-piece is divided transversely, or rather, that two short sleeves 17, 17 of equal length are used. It has been found that, by inserting these short sleeves into the bush from opposite ends, assembly is greatly facilitated and the risk of displacing the rubber sleeve 3 is reduced.

In Figure 4, two sleeves 18, 18 are shown in process of being inserted into the bush, each having a small flange 19 at its outer end. The sleeves are preferably tapered as shown, so that when they are in position the rubber sleeve 3 is under higher compression at the ends than at the centre, when the bore of the eye 4 is uniform. On the other hand, if the bore of the eye is greater at the ends than in the centre, as is often the case, the tapered sleeves 18, 18 effect a substantially uniform radial compression of the rubber sleeve 3 throughout its whole length.

Should lubrication of the bush become desirable, as, for instance, to facilitate the entry of the sleeves 6 or 17, castor oil, or other vegetable oil, may be used.

In most cases the liner would be a complete plain tube, but, if desirable, it could be slit lengthwise to facilitate the insertion of the oversize inner member and to allow the necessary radial compression of the rubber.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The combination with concentric internal and external bearing members capable of relative angular movement, of a composite bush comprising a rubber sleeve united to a liner of harder material, the external diameter of the bush being substantially equal to the bore of the external member and the bore of the bush being so much less than the external diameter of the inner member that, as the parts are being assembled with the bush between the members, the bush will be

considerably compressed in a radial direction.

2. The combination with concentric internal and external bearing members capable of relative angular movement, of which the former is a bolt, of a composite bush which fits into the external member and comprises a rubber sleeve united to a liner of harder material, and a metal sleeve which surrounds and is secured to the bolt and the external diameter of which is so much greater than the bore of the bush that, when the parts are assembled with the metal sleeve on the bolt and the bush between the metal sleeve and the external member, the bush will be subjected to a material radial compression.

3. An arrangement according to Claim 2, wherein the metal sleeve is divided transversely.

4. An arrangement according to Claim 3, wherein the parts of the metal sleeve are externally tapered towards their inner ends.

5. The complete concentric bearing members with interposed composite bush bearing, substantially as described with reference to Figure 1, Figure 2, Figure 3 or Figure 4 of the accompanying drawings.

Dated this 1st day of January 1931.
ERIC W. WALFORD, M.I.A.E.
Fellow of the Chartered Institute of Patent Agents,
19, Hertford Street, Coventry,
Agent for the Applicant.

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Fig. 1.

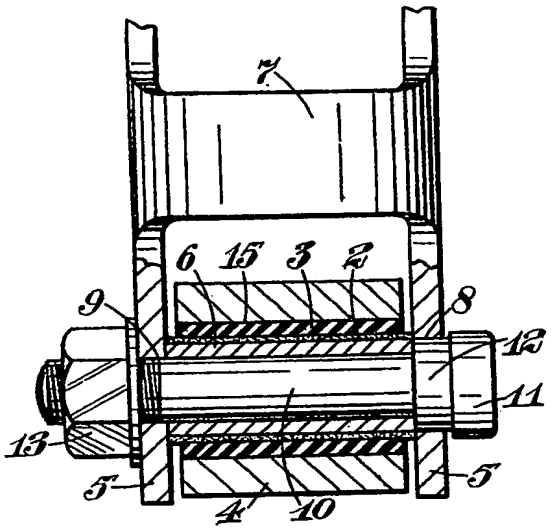


Fig. 2.

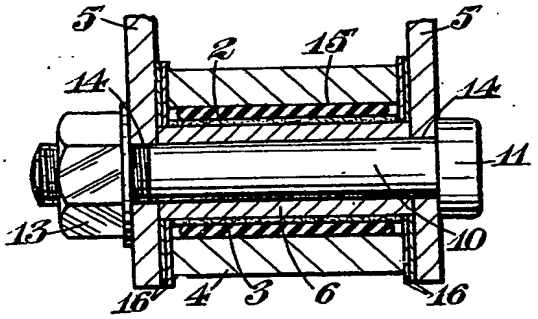


Fig. 3.

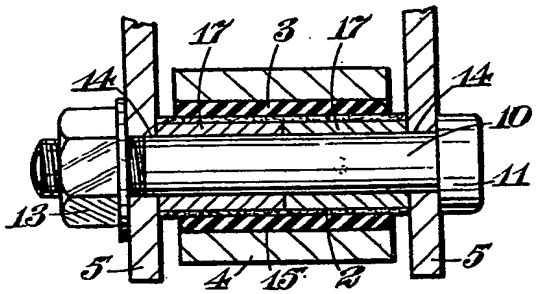
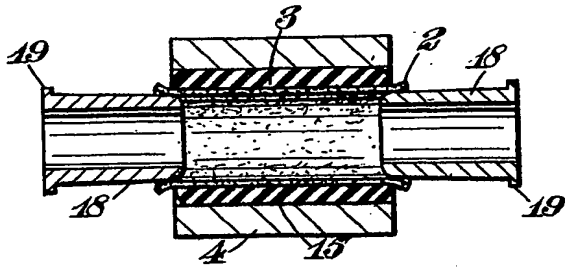


Fig. 4.



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